

Exhibit I

Keywords: Data compression, Transfer Syntax, Compression Algorithm, JPEG, RLE, Run Length Encoding, Lossless, Lossy, JPEG 2000

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Wavelet

Data **compression** is specified as part of the **Transfer Syntax**. **DICOM** used to support many different compression algorithms (eighteen in total). Prior to 2002, all compression schemes were **JPEG** based, except for run-length encoding (**RLE**).

There are two basic groups of JPEG compression schemes in use: **lossless**, which is used when the original image can be completely reconstructed from the compressed data, and **lossy** compression, causing some degree of information loss.

When compressing with more than a factor of about 3 to 1, lossless compression is not possible anymore, and the decompressed image will start to look different from the original image. JPEG has a disadvantage that it creates visible block artifacts when compressing images close to 10 to 1 or more, and is, therefore, not visually appealing.

Radiologists are very careful not to use too much compression because of the potential impact on the capability to perform a proper diagnosis.

Wavelet compression algorithms do not have the same traditional JPEG blocking artifacts, but rather rice artifacts, which do not look as bad, and seem to perform somewhat better because they can tolerate a higher compression ratio without impacting the clinical information as easily.

Wavelet compression algorithms were approved by the **JPEG 2000** Committee, and are now incorporated in the DICOM standard as an official Transfer Syntax. That means that pre-2002 applications that were using wavelet compression now can make their implementations JPEG 2000 compliant and change from proprietary to DICOM standard support.